

C L A I M S

1. A process for the removal of SO₂, HCN and H₂S and optionally one or more compounds from the group of COS, CS₂ and NH₃ from a first gas stream, which process comprises the steps of:
- 5 (a) removing SO₂ from the first gas stream by contacting the first gas stream in a hydrogenation zone with a hydrogenation catalyst in the presence of hydrogen to obtain a second gas stream;
- 10 (b) removing HCN and optionally COS and/or CS₂ from the second gas stream obtained in step (a) by contacting the second gas stream in a hydrolysis zone with a hydrolysis catalyst in the presence of water to obtain a third gas stream;
- 15 (c) removing NH₃ from the third gas stream by contacting the third gas stream in a NH₃-removal zone with an aqueous acidic washing liquid to obtain an ammonium-comprising aqueous stream and a fourth gas stream;
- 20 (d) removing H₂S from the fourth gas stream by contacting the fourth gas stream in a H₂S-removal zone with an aqueous alkaline washing liquid to obtain a H₂S-depleted gas stream and a hydrogensulphide-comprising aqueous stream;
- 25 (e) contacting the hydrogensulphide-comprising aqueous stream obtained in step (d) with sulphide-oxidizing bacteria in the presence of oxygen in an oxidation reactor to obtain a sulphur slurry and a regenerated aqueous alkaline washing liquid;

(f) separating at least part of the sulphur slurry obtained in step (e) from the regenerated aqueous alkaline washing liquid and;

5 (g) recycling regenerated aqueous alkaline washing liquid obtained in step (e) to the H₂S-removal zone in step (d).

2. A process according to claim 1, wherein the sulphur-load in the H₂S-removal zone in step (d) is between 50 and 50000 kg/day, preferably between 75 and 20000 kg/day, more preferably between 100 and 10000 kg/day.

10 3. A process according to claim 1 or 2, wherein the total concentration of sulphur- compounds in the treated gas is below 30 ppmv, preferably between 0.01 and 20 ppmv.

15 4. A process according to any one of claims 1 to 3, wherein the total concentration of H₂S is below 30 ppmv, preferably between 0.01 and 20 ppmv.

5. A process according to any of claims 1 to 4, wherein the washing liquid in step (d) is buffered, preferably at a pH of between 6 and 10, more preferably at a pH between 6.5 and 9.

20 6. A process according to any of claims 1 to 5, wherein the contents of the oxidation reactor in step (e) is buffered, preferably at a pH between 6 and 10, more preferably between 7 and 9.

25 7. A process according to any of claims 1 to 6, wherein the oxidation reactor in step (e) has a volume of between 5 and 2500 m³.

30 8. A process according to any of claims 1 to 7, wherein the sulphur slurry obtained in step (e) is re-slurried, filtered and dried to obtain a sulphur-content of at least 95 wt%, preferably at least 99 wt%.

9. A process according to any of claims 1 to 8, wherein water or steam or a mixture thereof is added to the

second gas stream prior to contacting the first gas stream in a hydrolysis zone with a hydrolysis catalyst in step (b).

- 5 10. A process according to any one of claims 1 to 9, wherein the water/steam content of the second gas stream is between 10 v/v% and 80 v/v%, preferably between 20 v/v% and 70 v/v%, more preferably between 30 v/v% and 50 v/v%, based on steam%.